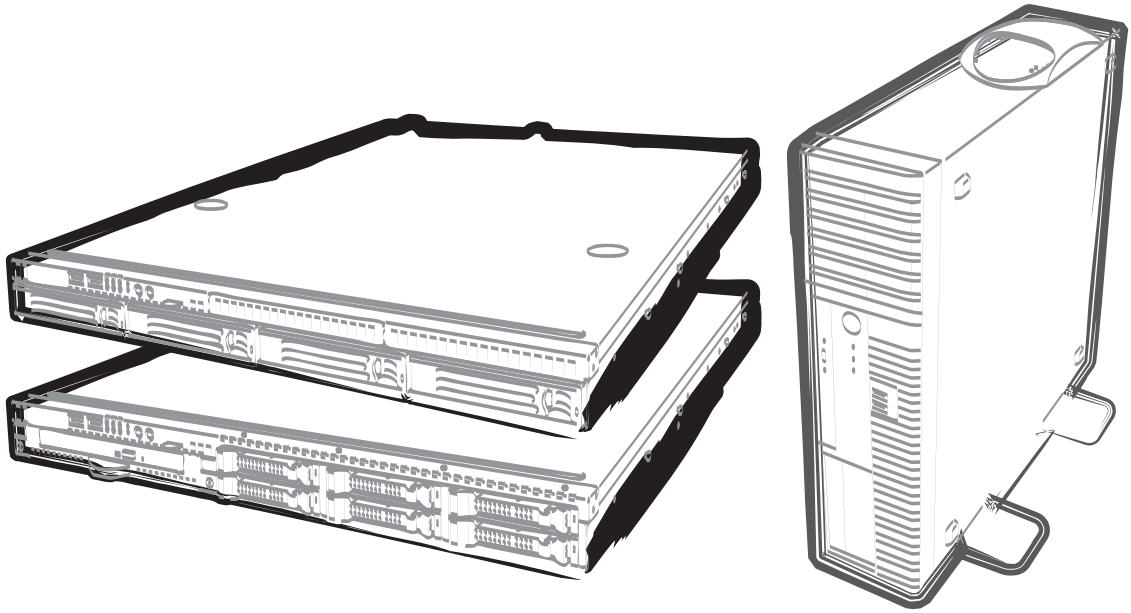
Express5800

NEC



NEC Express Server

Express5800 Series

EXPRESSSCOPE Engine 3
User's Guide

1. Overview
2. Configuring the Host System
3. Configuring a Management PC
4. Networking
5. Using Remote Management
6. Command Line Interface
7. WS-Management (Web Service for Management)
8. Troubleshooting

4th Edition Jun, 2012
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ABOUT THIS USER' S GUIDE

This User's Guide provides the instructions for properly using the EXPRESSSCOPE Engine 3. Please keep this document at hand for a quick reference and use it when you encounter any questions or troubles while using the EXPRESSSCOPE Engine 3 for remote control, monitoring, and management of the host system.

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SYMBOLS

The following symbols are used throughout this manual.

Items to be observed or points to be noted when using this product.

Items to be checked when using this product or software.

Information useful or convenient for you.

Example of troubles occurred.

PREFACE

The EXPRESSSCOPE Engine 3 enables you to monitor the operating status of the host system (power supplies, fans, temperature and so forth), to operate the host system's keyboard, video, and mouse (KVM) from a remote console* and to access to CD-ROM/Floppy disk drives on a remote site*. The EXPRESSSCOPE Engine 3 is enabled by a system management LSI called "BMC (Baseboard Management Controller)" and thus referred to as the "BMC" hereinafter in this User's Guide.
*The Remote KVM and Remote Media functions are optional.

1. Overview

The host system comes standard with the BMC (system management LSI) and a management LAN port dedicated to the BMC. By connecting the management LAN port to your network, you can monitor and control the host system from a remote site via a Web browser and SSH client.

With the optional N8115-04 Remote KVM and Media License, you can operate the host system's KVM (keyboard, video, and mouse) from a remote console and access CD-ROM/DVD-ROM/floppy disk drives and USB memory in a remote site.

2. Configuring the Host System

This chapter describes the settings necessary to configure the BMC in the host system.

DEFAULT NETWORK SETTINGS

The BMC's default network settings are as follows:

IP Address:	**192.168.1.1**
User Name:	**Administrator**
Password:	**Administrator**

- Connect the management LAN port to the private network on which the default IP address "192.168.1.1"is reachable. If the default IP address is not reachable on the network, assign a new IP address to the management LAN by using the BMC Configuration of the Off-line Tool in the host system. Refer to "Management LAN Settings" in the next page for the settings.

For security reasons, change the above default settings (IP address, User Name, and Password) to the ones appropriate in your network environment. Refer to "Chapter 5: Using Remote Management" for details.

- The remote management function is enabled by default. (In some systems, the remote management function is disabled by default.) So, If the remote management function is not used, disable this settings by using the BMC Configuration of the Off-line Tool. Refer to "Management LAN Settings" in the next page for the settings.

MANAGEMENT LAN SETTINGS

You can configure basic setting of management LAN settings of BMC for remote management using Web server function and command line interface of BMC by using some tools

- Web Browser
  Please refer to Chapter 5 for details.
- BMC Configuration (Off-line)
  Press the F4 key during POST(Power on Self test) or displaying logo immediately after power on or reset the host system to enter the BMC Configuration.
- BMC Configuration (On-line Windows/Linux).
  It is possible to install it from NEC EXPRESSBUILDER of the host system attachment.

The item that can be set with each tool is different. Please refer to help of each tool for details of a set item.

Setting item	Web Browser	Off-line BMC Configuration	On-line BMC Configuration Tool (Windows/Linux)
BMC LAN Setting Shared LAN Port or Management LAN Port	NG	OK	NG
IP Address Subnet Mask Default Gateway DHCP	OK	OK	OK
Service Settings HTTP/HTTPS/SSH	OK	OK	OK
BMC Initialization	NG	OK	OK

Management LAN / Shared BMC LAN

The function for BMC to use operation LAN of the host system is called Shared BMC LAN.

Select [Enabled] to share a system LAN port with BMC LAN. If you use a management LAN port for the BMC, select [Disabled]. The management LAN port is not available when this setting is set [Enabled]. (Default setting is [Enabled]. In some systems, this menu is not supported. Please refer to the User's Guide of your host system for more details.)

IP Address

If DHCP is not used to automatically obtain an IP address, enter the BMC's IP address.

If DHCP has been used, an automatically obtained IP address will appear. (Default setting is 192.168.1.1.)

Subnet Mask

If DHCP is not used to automatically obtain a subnet mask IP address, enter the

subnet mask of your management LAN.
If DHCP has been used, an automatically obtained subnet mask IP address will appear. (Default setting is 255.255.255.0.)

Default Gateway

If DHCP is not used to automatically obtain a default gateway IP address, enter the default gateway of your management LAN.
If DHCP has been used, an automatically obtained default gateway will appear. (Default setting is 0.0.0.0.)

DHCP

If you want to obtain an IP address, choose [Enabled].
If you want to manually configure an IP address, choose [Disabled].
(Default setting is [Disabled](*).)

Web Interface:

HTTP Interface

Select [Enabled] to use the Web Server function using the HTTP. If not, select [Disabled]. (Default setting is [Enabled](*).)

HTTP Port Number

Specify the HTTP port number. (Default setting is 80.)

HTTPS Interface

Select [Enabled] to use the Web Server function using the HTTPS(SSL). If not, select [Disabled]. (Default setting is [Enabled](*).)

HTTPS Port Number

Specify the HTTPS(SSL)port number. (Default setting is 443.)

Command Line Interface:

SSH

Select [Enabled] to use the Command Line Interface using SSH. If not, select [Disabled]. (Default setting is [Enabled](*).)

SSH Port Number

Specify the BMC's SSH port number. (Default setting is 22.)

BMC Initialization

The BMC Configuration will be cleared. Please use this function when you forgot your user name and password, etc. for remote management via a Web browser and command line interface. This function will be executed when you select "YES" on confirmation menu which appears after pressing the "Enter" key. This menu invokes the BMC configuration clear operation after selecting the "YES".

- **These BMC Management LAN-related settings of BMC are not changed to default settings by executing the "Load Setup Default" of BIOS Setup Utility. (Execute the "BMC Initialization" to set default settings to the BMC Management LAN settings.)**
- **When "BMC Initialization" is executed, BMC is reset. It will take about tens of seconds by the time initialization is completed after it executes it.**

The BMC Initialization also deletes the settings for ESMPRO/ ServerManager(a software application bundled for remote management). Be sure to perform a backup for the ESMPRO/ServerManager settings before you change the BMC settings.

* In some systems, the default settings are different for DCHP, HTTP, HTTPS, and/or SSH.

3. Configuring a Management PC

This chapter describes the settings necessary for the remote management PC that will be connected to the host system.

SETTING YOUR BROWSER

Configure the following settings:

- Enable SSL.
- Allow Java Script execution.
- Allow Java execution.
- Accept Cookies.
- Allow Popup.
- Enable Stylesheet.

* If you use Microsoft Internet Explorer, the following configurations are required.
  - Add BMC's address to Trusted Sites.
  - Set Trusted Site's security level to Medium.
  - If Enhanced Security is enabled, adding [about:blank] to Trusted Sites is required.

SUPPORTED BROWSERS

The following browsers are supported by Windows XP (SP3), Windows Server 2003 R2 (SP2), Windows Server 2008, Windows Vista (SP1) and Windows Server 2008:

- Microsoft Internet Explorer 7.0
- Microsoft Internet Explorer 8.0

The following browser is supported by Red Hat Enterprise Linux WS(version 4), Red Hat Desktop(version 4), Red Hat Enterprise Linux WS(version 5) and Red Hat Desktop(version 5):

- Firefox 3.6

It's recommended that a browser be applied the latest service pack and the security patch.

J2SE RUNTIME ENVIRONMENT

The management PC requires Java2 Runtime Environment (JRE), Standard Edition 6.0.

JRE is available free of charge from Oracle Corporation. For security reasons, you are recommended to use the latest JRE update.

If the management PC runs Windows XP, remote media function may not work. You need to apply the latest Service Pack.

4. Networking

TCP/IP PORTS

The BMC uses the TCP/IP ports listed below. If you use the BMC in a firewall environment, you need to allocate the port numbers (shown in the right column) to the individual non-block ports.

Module name	Port #	Protocol	Direction	Module name	Port #
Remote Media (Non-Encryption)	Dynamic(*1)	TCP	⇔	BMC	5120(CD/DVD) 5122(USB MEM) 5123(FD) (*2)
Remote Media (Encryption)	Dynamic(*1)	TCP	⇔	BMC	5124(CD/DVD) 5126(USB MEM) 5127(FD) (*2)
Web browser (Non-Encryption)	Dynamic(*1)	TCP	⇔	BMC	80(*3)
Web browser (Encryption)	Dynamic(*1)	TCP	⇔	BMC	443(*3)
Remote KVM Console (Non-Encryption)	Dynamic(*1)	TCP	⇔	BMC	7578(*2)
Remote KVM Console (Encryption)	Dynamic(*1)	TCP	⇔	BMC	7582(*2)
SSH client	Dynamic(*1)	TCP	⇔	BMC	22(*3)
SMTP server	25(*4)	TCP	⇔	BMC	Dynamic
LDAP server	389(*5)(*6)	TCP	⇔	BMC	Dynamic
SNMP server	162	UDP	⇔	BMC	Dynamic

*1 The Dynamic ports are dynamically allocated ports and usually ranged from 1024 to 65535.

*2 Go to [Configuration]-[System Operation] to change the port number.

*3 Go to [Configuration]-[Network]-[Service] to change the port number.

*4 Go to [Configuration]-[Alert:]-[Mail Alert] to change the port number.

*5 If use TLS/SSL, default port number is 636.

*6 Go to [Configuration]-[User Management]-[LDAP] to change the port number.

BMC doesn't support connection via HTTP proxy server.

5. Using Remote Management

OVERVIEW

The BMC Web Server function allows you to control the host system's power and KVM from a remote console via a Web browser.

Part of the above function is implemented by Java Applet.

CONNECTING TO THE WEB SERVER

Access the following URL from the Web browser on the remote management PC:

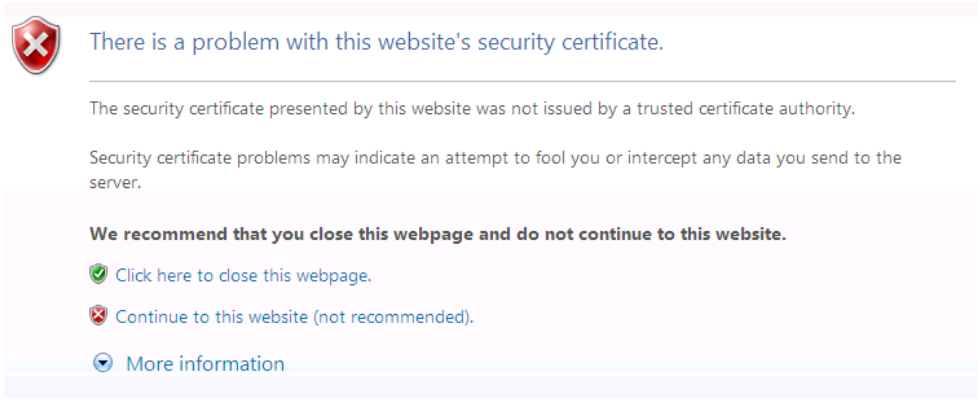
http://BMC_HostPort or https://BMC_HostPort

The "BMC_HostPort" URL includes the BMC's IP address or host name and a colon followed by a port number for HTTP or HTTPS connection: e.g. 192.168.1.1:80 If the port number is 80 for HTTP or 443 for HTTPS (default), you may omit the port number.

For security reasons, you are recommended to use HTTPS (SSL) connection. For better communication performance, use HTTP on a secured network.

When you connect via SSL, security warning messages may appear.

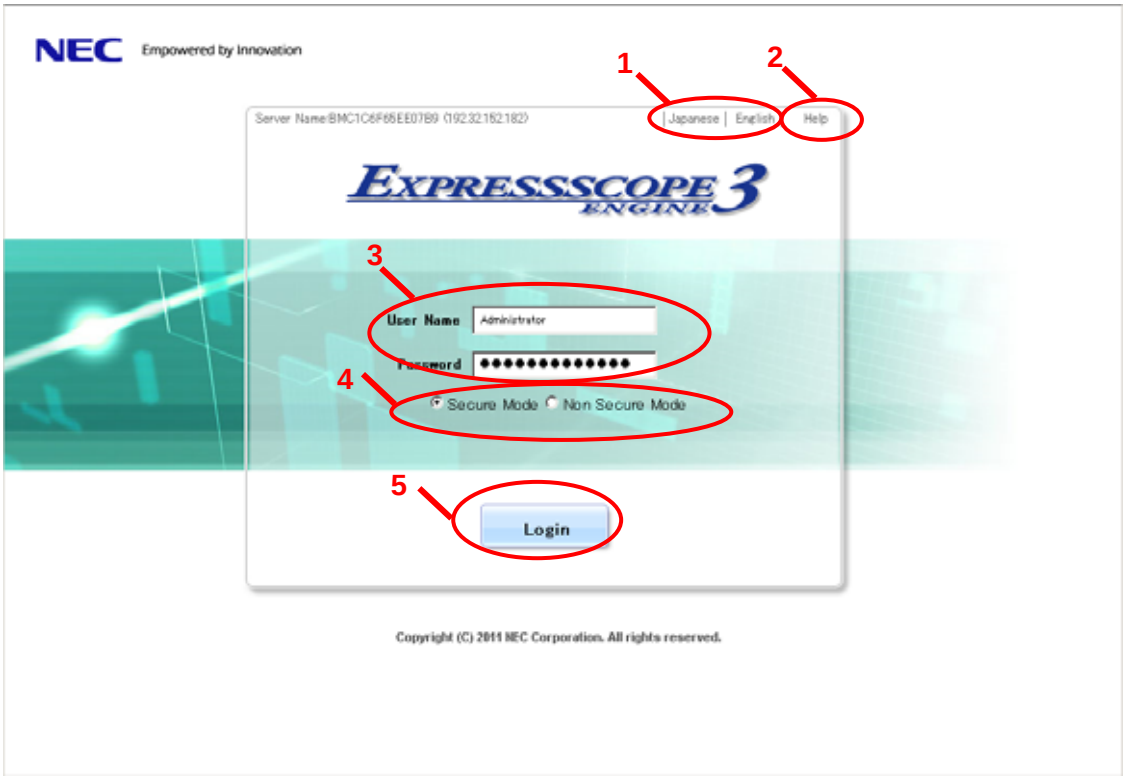
If you use Internet Explorer 7(or 8), the following page is displayed and HTTPS connection is blocked. In this case, select "Continue to this website" to continue.


There is a problem with this website's security certificate.
The security certificate presented by this website was not issued by a trusted certificate authority.
Security certificate problems may indicate an attempt to fool you or intercept any data you send to the server.
We recommend that you close this webpage and do not continue to this website.
Click here to close this webpage.
Continue to this website (not recommended).
More information

LOGIN AND LOGOUT

Login

When the login page appears, input the user name and password, and then click [Login].



1. The display language can be selected to English or Japanese.
2. The online help is displayed.
3. Please input username and password.
4. Secure Mode(HTTPS) or Non Secure Mode(HTTP) can be selected.
5. Please push "Login" button.

Notice **You can select the display language only in the login page. If you want to change the language after login, log out once and change the language in the login page.**

Notice **Do not use the “Reload” button in your browser after login.**

Notice **If you use Active Directory authentication, you need to input with the form of username@domainname in “User Name”.**

Logout

Click “Logout” in the upper right corner of the window. When a confirmation dialog appears, click [OK] to log out.

After you log out, you return to the login page. Besides, all the remote device windows that were opened during login will be closed.

Notice **If the browser is slow during login procedure, please restart your brower or logout.**

Notice **If the BMC becomes high loaded, BMC will be restarted very rare for recovery. In this case, an existing connection will be disconnected, so, please re-connect again.**

HEADER MENU

1. Login user name is displayed.
2. Login user’s privilege is displayed.
3. The environment of management PC is displayed, and set by clicking "Environment"..
4. License information is displayed.
5. The online help is displayed.

SERVER PANEL

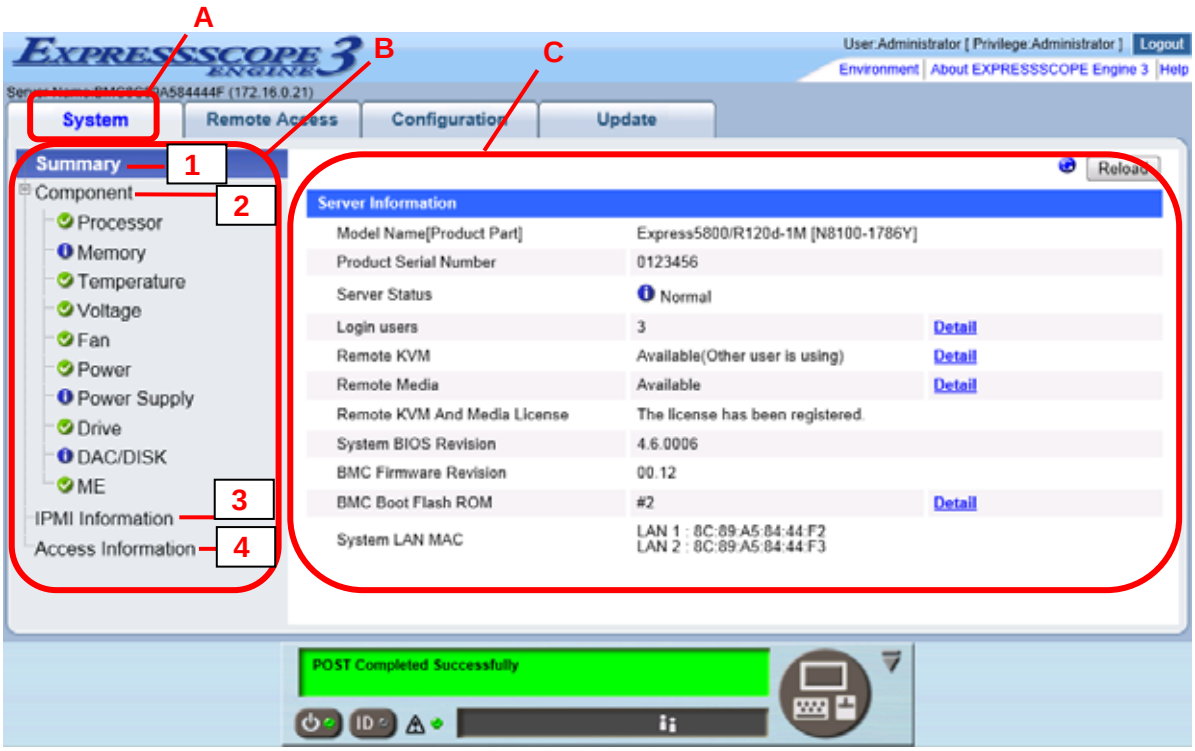
The server panel is displayed under a browser after log in. The server panel has following functions.

1. The virtual LCD that displays the state of the host system.
2. The Button to start RemoteKVM/Media
3. The button that minimizes the server panel.
4. The power switch and a lamp of the host system. The state of the power supply of the host system is shown.
5. The UID(Unit ID) switch and a lamp of the host system.
6. The status lamp of the host system. The state of the host system is shown.
7. The log in situation and the remote media usage condition of BMC are displayed.

Tips **Even if actual UID LED is not mounted into the host system, the UID LED indicator of the Server Panel functions as virtual UID LED.**

Tips **Refer to Maintenance Guide of the system for the message displayed in the Virtual LCD.**

SYSTEM



A. The system tab. BMC supported functions are displayed.

B. The menu that can be selected in the system tab is displayed.

C. Information selected by B is displayed. The screen of "Summary" is displayed in the above-mentioned example.

Menu

1 Summary

The state of information and BMC of the host system is displayed.

2 Component

Only items supported with the host system are displayed for each item of composition information. (processor, memory, temperature, voltage, fan, power, power supply, drive, DAC/DISK, and ME). Moreover, the item supported with the host system might not be displayed depending on the state of the system power supply and the presence state of the components such as devices.

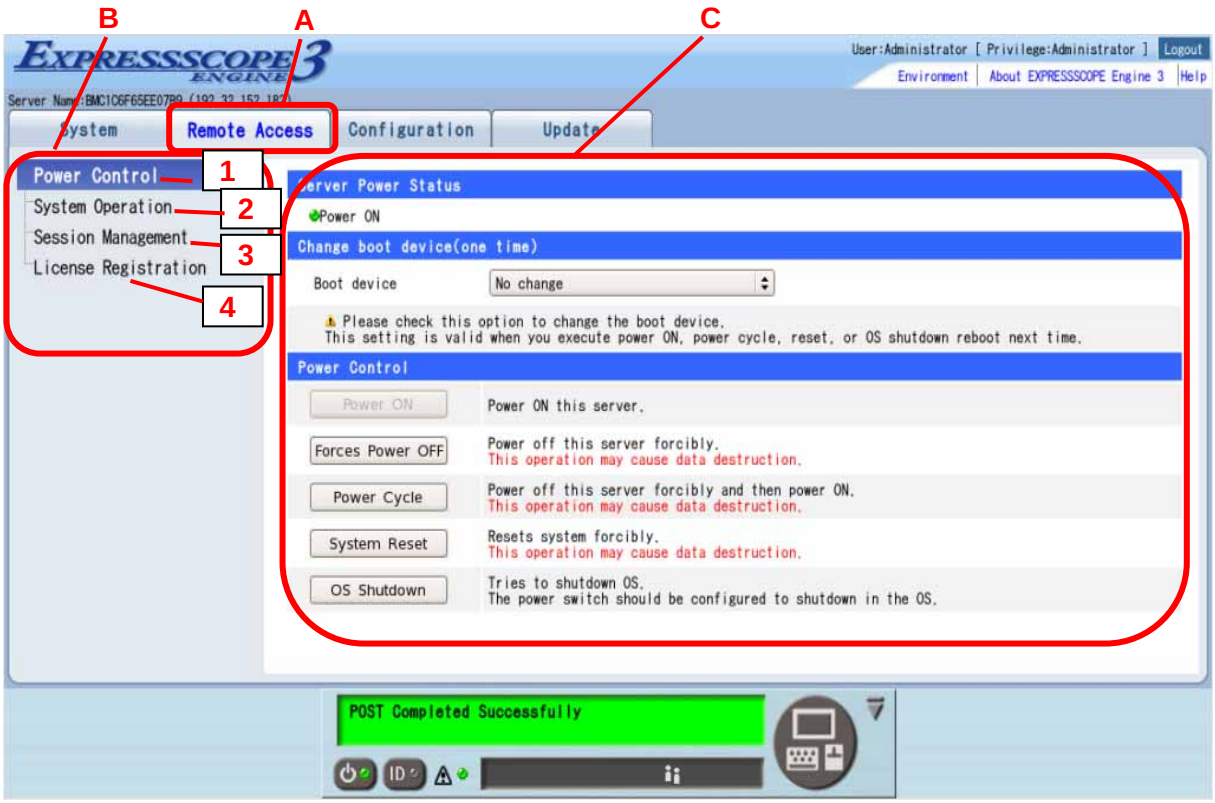
3 IPMI Information

Information (SEL,SDR,FRU,MC) is displayed in accordance with IPMI and it backs up. The preserved backup data can be referred to from the server management software (ESRAS utility and off-line maintenance utility).

4 Access Information

Login/Logout information and operation log are displayed.

REMOTE ACCESS



A. The remote access tab. BMC supported functions are displayed.

B. The menu that can be selected in the remote access tab is displayed

C. Information selected by B is displayed. The screen of "Power Control" is displayed in the above-mentioned example.

Menu

1 Power Control

Select Boot device of the host system, powering on/off and reset the system, shutdown the OS.

2 System Operation

Start RemoteKVM/Media, turn on/off of UID lamp, press Dump switch and reset BMC.

3 Session Management

The user who is logging in BMC can be managed.

4 Access Information

The license to use remote KVM/media is registered.

The host system detects remote media as following devices:

- **AMI Remote FD**
- **AMI Remote CD/DVD**
- **AMI Remote USB Mem**

The access lamp comes to remain lighting after it connects it according to the kind of the floppy disk drive of management PC.

When the operation into which the resolution on the host system side frequently changes after remote KVM is started, the remote KVM connection might be disconnect. In that case, please start remote KVM again.

CONFIGURATION

A. The configuration tab. BMC supported functions are displayed.

B. The menu that can be selected in the configuration tab is displayed

C. Information selected by B is displayed. The screen of "ECO" is displayed in the above-mentioned example.

Menu

1 Network

Set IP address and the service of the BMC and the SSL public key can be made.

2 User Management

Maintain user and Active directory/LDAP setting, register the SSH public Key.

3 Alert

The setting of which it alerts by using E-mail and SNMP from BMC can be done..

4 System Operation

RemoteKVM/media setting.

5 ECO

Power consumption and the throttling situation are displayed. Set to manage the electric power control.

6 Miscellaneous

Set to manage from SEL, the access log, AC-LINK, PEF, and the management software.

7 Backup/Restore

Backup and Restore each item that was set.

8 System BIOS

Some functions of System BIOS can be set.

For each BMC setting, the “Default” value of the setting from Web browser of BMC and the initial value of BMC Initialization are as the following table.

Menu	Setting	Web Browser “Default” value	BMC Initialization
Network	Management LAN	Management LAN	Management LAN
	Connection Type	Auto Negotiation	Auto Negotiation
	DHCP	Disable	Disable
	IP address	192.168.1.1	192.168.1.1
	Subnet Mask	255.255.255.0	255.255.255.0
	Default Gateway	0.0.0.0	0.0.0.0
	DNS Server	0.0.0.0	0.0.0.0
	Host Name	Blank	"BMC" + MAC address
	Domain Name	Blank	Blank
	Limitation Type	Allow All	Allow All
	HTTPS	Enable	Enable
	HTTPS Port	80	80
	HTTP	Enable	Enable
	HTTP Port	443	443
	SSH	Enable	Enable
	SSH Port	22	22
User Management	Active Directory Authentication	Disable	Disable
	User Domain Name	Blank	Blank
	Timeout	120	120
	Domain Controller Server Address1	0.0.0.0	Blank
	Domain Controller Server Address2	Blank	Blank
	Domain Controller Server Address3	Blank	Blank
	Group Name	Blank	Blank

	Group Domain	Blank	Blank
	Privilege	Administrator	User
	LDAP Authentication	Disable	Disable
	IP address	0.0.0.0	Blank
	Port	389 or 639	389
	Search Base	Blank	Blank
	Bind Domain Name	Blank	Blank
	Bind Password	Blank	Blank
Alert	Mail Alert	Disable	Disable
	Waiting time for SMTP server's response	30	30
	To:1	Enable	Disable
	To:2	Disable	Disable
	To:3	Disable	Disable
	From	Blank	Blank
	Reply-To	Blank	Blank
	Subject	Blank	Blank
	SMTP Server	0.0.0.0	0.0.0.0
	Port	25	25
	Authentication	Disable	Enable
	Alert Level	Error, Warning	Separate Setting
	SNMP Alert	Disable	Disable
	Computer Name	Blank	Blank
	Community Name	public	public
	Alert Progress	One Alert Receiver	One Alert Receiver
	Alert Acknowledge	Enable	Disable
	Alert Receiver1	Enable	Disable
	Alert Receiver2	Disable	Disable
	Alert Receiver3	Disable	Disable
	Alert Level	Error, Warning	Separate Setting
	Alert Retry Count	3	0
	Alert Timeout	6	0
System Operation	Remote KVM Console Encryption	Enable	Disable
	Port (No Encryption)	7578	7578
	Port (Encryption)	7582	7582
	Cursor Mode	Dual	Single
	Coordinate Mode	Relative	Absolute
	Keyboard Language	When login in Japanese; Japanese, When login in English; English	English
	Remote Media Encryption	Enable	Disable

	Port (No Encryption)	5120	5120
	Port (Encryption)	5124	5124
ECO	Aggressive Mode(*1)	Disable	No change
	Power Threshold(Pa)	Max Power Consumption	No change
	Correction time limit	2	No change
	Shutdown System	Disable	No change
	Non-Aggressive Mode(*2)	Disable	No change
	Power Threshold(Pn)	Max Power Consumption - 10	No change
	Correction time limit	10	No change
	Safe Power Capping	Disable	No change
	Boot Time Configuration(*3)	Disable	No change
	Performance Mode	Performance Optimized	No change
	Disable CPU Cores	0	No change
Miscellaneous	Behavior when SEL repository is full	Stop logging SEL	No change
	Access Log HTTP	Disable	Disable
	HTTPS	Disable	Disable
	SSH	Disable	Disable
	Operation	Disable	Disable
	Power Restore Delay AC-LINK	Last state	No change
	Delay Time	Minimum configurable time	No change
	Platform Event Filtering	Enable	Disable
	ESMPRO Management	no change	Disable
	Authentication Key	guest	Blank
	Redirection (LAN)	Enable	Disable

*1: This menu is shown as “Critical Power Capping” in some host system.

*2: This menu is not supported in some host system.

*3: This menu is not supported in some host system.

Example of an E-mail alert:

Following contents are sent as E-mail alert.

Virtual LCD Message:
System Rear FAN4 Lower Non-Critical

Event Information:
Record ID: 0AA0h
Timestamp: 10/13/2011 17:59:23
Severity: Non-critical
Description:
Fan(Speed) - Error
Lower Non-critical - going low
Dump:
A0 0A 02 FB 26 97 4E 20 00 04 04 43 01 57 FF B6

URL:
http://192.168.1.11:80
https://192.168.1.11:443

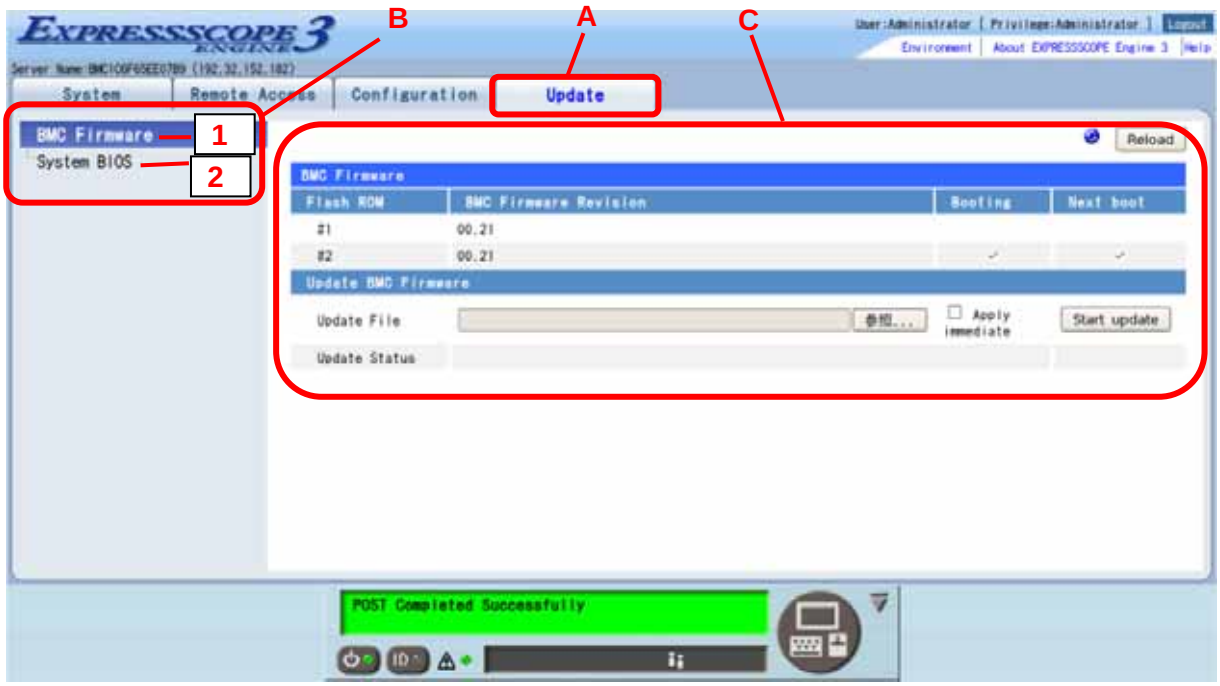
BMC Network Information:
BMC IP Address: 192.168.1.1
BMC Host Name: BMCxxxxxxxxxxx

Firmware Revision:
System BIOS Revision: x.x.xxxx
BMC Firmware Revision: xx.xx
SDR Revision: SDR Version xx.xx

Product Information:
Manufacturer: xxx
Product Name: xxxxxxxxxxx/xxxxx-xx
Part/Model Number: [xxxxx-xxxxx]
Version: FR1.0
Serial Number: xxxxxxx
Asset Tag: xxx-xxxxxx-xxx

- **You should use a straight through ethernet cable if you set 10Mbps or 100Mbps as 'Connection Type' of Network.**

UPDATE



A. The update tab. BMC supported functions are displayed.

B. The menu that can be selected in the update tab is displayed

C. Information selected by B is displayed. The screen of "BMC Firmware" is displayed in the above-mentioned example.

Menu

1 BMC Firmware

Update the BMC firmware regardless of power-off/on of the host system.

2 System BIOS

Update the System BIOS regardless of power-off/on of the host system.

6. Command Line Interface

OVERVIEW

With the BMC Command Line Interface, you can control the host system from a remote SSH client. The BMC supports SSH (Version 2) protocol.

CONNECTING TO BMC

Access the BMC IP address or DNS host name from SSH client on the remote management PC.

To use Command Line Interface, you need to change the configuration of the command line interface (SSH) to be enabled by any of the setting of the Off-line BMC Configuration Tool or On-line BMC Configuration Tool or Setting of Web browser. Refer to the "Management LAN Settings" in the "Chapter 2: Configuring the Host System".

You can change the BMC's SSH port number by using the Off-line BMC Configuration Tool, On-line BMC Configuration Tool or a web browser. The default settings are as follows:

SSH: 22

A security warning messages regarding your server certificate may be displayed when you access the BMC from a SSH client.

SSH connection is disconnected automatically after one minute of inactivity after login prompt is displayed.

LOGIN AND LOGOUT

Login

Enter your user name and password at login prompt. A command prompt will be displayed after login. Also you can login by using public key authentication.

The user account is common to the one for a remote management function via web browser.

The number of users who can log in the system using the command line interface at the same time is three users or less. Therefore, you cannot log in the system when other three users have been logging in the system using SSH clients via the command line interface. Check whether other three users are logging in the system, if you cannot log in via the command line interface.

Only a single user among users who are using the command line interface or ESMPRO/ServerManager can use a character-based remote console via the command line interface. Check whether another user is using a character-based remote console, if you cannot use a character-based remote console.

Refer to the “CONFIGURATION” in the Chapter 5: Using Remote Management” for registering SSH public key.

Logout

Enter the “exit**”** command at the command prompt. The SSH client will be disconnected from the BMC after logout.

BASIC COMMANDS

This section describes basic commands to use them as the command line interface. These basic commands manage the host system by using the concept of command (verb) and target (Managed Element) proposed by DMTF (Distributed Management Task Force).

Each basic command functions to a specified target. The target points the managed element by address path much like the path to a file in a file system.

Both absolute path, which is started from "/", and relative path are available for pointing the target. Specifically, "." and ".." are supported. The "." means the current default target and the ".." means the parent target.

Each basic command functions to the current default target when the <target>, which is an argument pointing a target for the command, is not specified to the basic command. The current default target can be changed by the cd command. The current default target is "/admin1" when the command line interface session is started.

The current default target is displayed at the left side of the command prompt ("->").

Help string, command syntax, of each command appears when "-h" option is specified as the <options> of the command. The argument placed between "[" and "]" is omissible.

The user must have an account as the following user level to use the basic commands:

- **cd, exit, help, show and version can be used under an account as all user levels.**
- **stop, start and reset are needed an account as operator or administrator user level to use these commands.**
- **set is needed an account as administrator user level to use this command.**

Maximum number of input character for command line interface is 250.

cd

Syntax:

cd [<options>] [<target>]

Description:

The cd command changes the current default target to the target specified by the <target> argument.

exit

Syntax:

exit [<options>]

Description:

The exit command terminates and logs out the user session.

help

Syntax:

help [<options>] [<help topics>]

Description:

A basic command, <command>, can be specified for the <help topics>. The help command displays the help string for specified basic command when <command> argument is specified.

reset

Syntax:

reset [<options>] [<target>]

Description:

The reset command performs a hardware reset on the <target>.

/admin1/system1 and /admin1/sp1 are available for the <target> of the reset command. For /admin1/system1, the host system is reset. For /admin1/sp1, the BMC is reset.

Reset the BMC only if a problem occurs in the BMC and don't reset the BMC in normal operation. Also the connections with Web browser and SSH client are disconnected if you reset the BMC.

set

Syntax:

set [<options>] [<target>] <propertyname>=<value>

Description:

The set command is used to set the value of one or more properties of target specified by the <target>. The command accepts a target specified by the <target> and series of <propertyname>=<value> pairs which is will try and apply. The <propertyname> means a name of property set by the command. The <value> means a new value set by the command.

One or more <propertyname>=<value> pairs can be specified by delimiting between each pair in space.

The set command requires <propertyname>=<value> command line argument except when -h is specified as the <options>.

show

Syntax:

show [<options>] [<target>] [<properties>]

Description:

The show command is used to display information about the target specified by the <target> argument.

The command displays the target specified by the <target> as the first line of the information. It displays the current default target in the first line if <target> is not specified.

The default behavior of the command for the target specified by the <target> is as follows. The command display targets which are contained by the specified target after the "Targets" string. The command displays properties which are contained by the specified target after the "Properties" string. The properties are displayed in the form of property=value. The command displays basic commands (verbs) and special extended commands which are available for the specified target after the "Verbs" string.

The command displays the property specified by the <properties> in the form of property=value if the <properties> is specified. The command displays all properties which are contained by the specified target if the <properties> is not specified.

There is -display <arg values> option which can be specified by the <options> for the show command. The option can control the type of information that is displayed about the target specified by the <target>. Valid option argument values as the <arg values> for this option include "targets", "properties", "verbs", and "all". The option argument values can select the above "Targets", "Properties" and "Verbs" information that is displayed. “all” displays the whole. The default for the -display option control is "all".

start

Syntax:

start [<options>] [<target>]

Description:

/admin1/system1 and /admin1/system1/textredirectsvc1 are available for the target of the start command.

The start command performs a power on to the host system if /admin1/system1 is specified by the <target>.

The start command starts a character-based remote console if /admin1/system1/textredirectsvc1 is specified by the <target>.

stop

Syntax:

stop [<options>] [<target>]

Description:

The stop command performs a normal power off request (OS shutdown request) or a forced power off request.

/admin1/system1 is available for the target of the stop command. The stop command with no option as the <options> performs a normal power off request (OS shutdown request) to the host system if /admin1/system1 is specified by the <target>. The command with -f (or -force) as the <options> performs a forced power off request to the host system if /admin1/system1 is specified by the <target>.

version

Syntax:

version [<options>]

Description:

The version command is used to display the version of the command line protocol specification which is supported.

REMOTE CONTROL

You can perform remote control of the host system at the command prompt.

Performing remote control when the operating system is running may cause the loss of data in the host system.

The user must have an account as operator or administrator for remote control.

Power ON

Enter the following command at the command prompt.

```
start /admin1/system1
```

Forced Power OFF

Enter the following command at the command prompt.

```
stop -force /admin1/system1
  or
stop -f /admin1/system1
```

OS Shutdown

Enter the following command at the command prompt.

```
stop /admin1/system1
```

The above OS shutdown is equivalent to pressing the POWER switch when the power of the host system is on. Your operating system must be set to shut down when you power off the system.

System Reset

Enter the following command at the command prompt.

```
reset /admin1/system1
```

An above system reset is failed when the power of the host system is off.

Remote Console

To start a character-based remote console, enter the following command at the command prompt.

```
start /admin1/system1/textredirectsvc1
```

To return from the character-based remote console to the command interface session, enter the **<ESC>stop** keys (<ESC>key, <s>key, <t>key, <o>key and <p>key) during the character-based remote console.

The standard serial port B (COM B) on the host system cannot be used for connecting another device in this cases because the BMC occupies the serial port B.

To use a character-based remote console, set appropriate settings for the console redirection function of the host system's serial port on the BIOS Setup Utility in advance.

Especially, please use the following items by the following setting:

- **BIOS Redirection Port : Serial Port B**
- **Baud Rate : 19.2K**
- **Flow Control: CTS/RTS**
- **Terminal Type: PC ANSI**

For the system BIOS Setup Utility, please refer to the User's Guide of your host system.

Only a single user among users who are using the command line interface or ESMPRO/ServerManager (a software application bundled for remote management) can use a character-based remote console via the command line interface or ESMPRO/ServerManager. Once the first user uses the character-based remote console, other users cannot use any character-based remote console from any SSH clients or ESMPRO/ServerManager. Check whether another user is using a character-based remote console, if you cannot use a character-based remote console.

To show the usage status of the character-based remote console by other users of the command line interface or ESMPRO/ServerManager, enter the following command at the command prompt.

show /admin1/system1/textredirectsvc1/textredirectsap1

You can confirm the usage state by value of EnabledState of the "Properties" which is displayed by the command.

EnabledState=2 : Using the character-based remote console by current user or other user.

EnabledState=6 : Not in use.

To stop the character-based remote console using by other user forcibly, enter the following command at the command prompt.

set /admin1/system1/textredirectsvc1/textredirectsap1 EnabledState=6

Please confirm in advance whether it is OK to stop the character-based remote console using by other user forcibly.

The user must have an account as administrator for stopping the character-based remote console forcibly.

UID Switch Control

You can turn on/off the UID (Unit ID) LED on the host system by the virtual UID switch through the command line interface. This function is available only in the host system with UID LED.

The user must have an account as administrator for UID Switch Control (turning on or turning off the UID LED) because of using the set command for the UID Switch Control.

Turning on UID LED

Enter the following command at the command prompt. State of the UID LED becomes same state of turning on the LED by using UID (Unit ID) switch of the host system.

```
set /admin1/system1/led1 ActivateState=2
```

Turning off UID LED

Enter the following command at the command prompt. State of the UID LED becomes same state of turning off the LED by using UID (Unit ID) switch of the host system.

```
set /admin1/system1/led1 ActivateState=4
```

Confirmation of state of turning on UID LED

Enter the following command at the command prompt.

```
show /admin1/system1/led1
```

You can confirm the state of the UID LED by value of ActivateState of the "Properties" which is displayed by the command.

ActivateState=2 : UID LED state is turned on by UID switch .
ActivateState=3 : UID LED sate is blinking by the management software .
ActivateState=4 : UID LED state is turned off by UID switch .

If the UID LED is not mounted into the host system, the “UID Switch Control” function works only to the virtual UID LED of the Server Panel. Please refer to the User’s Guide of your host system for the description of the UID LED.

- **The UID LED will blink (flash) when it is controlled by Chassis Identify function of management software such as ESMPRO/ ServerManager. The UID LED will turn on when it is controlled by pushing the UID switch of the host system or using UID switch control function of BMC's web server or command line interface. For actual display state of the UID LED, blinking (flashing) the UID LED is higher priority than turning on it when it is controlled at a same time (blinking state AND turning on state).**
- **Blinking (flashing) UID LED by management software can be turned off (release the blinking state) only by management software. Turning on UID LED by UID switch control (actual switch of the host system or the function of BMC's web server or command line interface) can be turned off (release turning on state) only by the UID switch control.**

SYSTEM EVENT LOG

You can display system event log and modify setting of the system event log through the command line interface.

Viewing system event log

To move the current default target to /admin1/system1/log1, enter the following command at the command prompt.

```
cd /admin1/system1/log1
```

Here, to confirm the total number of system event log records, enter the following command. The "Targets" section reported by the following command indicates the "record<N>" target(s). <N> means any value between 1 and the total number of the system event log records.

```
show
```

To show the total number of system event log records more than 1000 event logs, it may take about tens of seconds.

Next, when the following command is input, information of a specific record is displayed at "Properties" section: Here, <N> means record number which you would like to confirm.

```
show record<N>
```

For example, enter the following command when you would like to confirm the number 1 record.

```
show record1
```

The example of displaying information in this case is shown below.

```
-> show record1
Command Status: COMMAND COMPLETED

ufip=/admin1/system1/log1/record1
    Properties:
        RecordID=1
        CreationTimeStamp=20110324130745.000000+000
        RecordFormat=*RecordID*RecordType*TimeStamp*GeneratorID*EvMRev*Sens
        orType*SensorNumber*EventType*EventData1*EventData2*EventData3*
        RecordData=*1*2*1300972065*32*4*16*9*111*66*143*255*
    Verbs:
        cd
        exit
        help
        show
        version
```

Setting of system event log

To move the current default target to /admin1/system1/log1, enter the following command at the command prompt.

```
cd /admin1/system1/log1
```

The "Properties" section reported by the following command indicates the current setting of system event log.

```
show
```

Enter the following command if you would like to modify a property of the setting of system event log .

```
set <Property>=<New value>
```

The properties which the system event log target contains are as follows:

- **oemnec_selbehavior**

  This specifies the behavior when the system event log repository is full. The valid values for this property are followings. This is the dynamic setting.

  0 : Stop logging the system event log. The system event log is not recorded any more when the system event log is full.

  1: Clear all system event logs. All system event logs are cleared when the system event log is full.

  2: Overwrite oldest system event log. Oldest system event log is overwritten with new system event log when the system event log is full.

For example, enter the following command when you would like to enable the auto clear of system event log.

```
set oemnec_selbehavior=1
```

The user must have an account as administrator for modifying the setting of the system event log.

ACCESS LOG

You can display, clear, and set the access log for the management LAN.

The user must have an account as administrator for clearing and setting the access log.

The following are events supported by the Access Log function.

- **Login and logout events for HTTP, HTTPS, and SSH connections**
- **System control (Power OFF/ON, system reset, etc…) via Web browser.**
- **Modify the setting (Network setting, etc…) via Web browser.**
- **Start the remote KVM**

User Information is not registered by logout events for SSH connections.

Viewing access log

To move the current default target to /admin1/sp1/log1/record1, enter the following command at the command prompt.

```
cd /admin1/sp1/log1/record1
```

Enter the following command, if you would like to confirm the access log.

```
show
```

The example of displaying the access log is shown below.

```
 timestamp       user          ipaddress          protocol            event
 ----------------+-----------+----------------------+--------------+-----------------------------------------
 06/10/2009      ope          192.168.2.14         SSH            Login Successful 13:52:19
 ------------------------------------------------------------------------------------------------------------------
 06/10/2009     admin         192.168.2.14         SSH            Login Successful 13:53:14
 ------------------------------------------------------------------------------------------------------------------
 06/10/2009     user          192.168.2.14         HTTP           Login Successful 13:55:49
-------------------------------------------------------------------------------------------------------------------
```

You can display only access log that corresponded to the specified from following condition.

- **timestamp**

  Specify the date by the following format: MM/DD/YYYY

- **user**

  Specify the user name.

- **ipaddress**

  Specify the IP address on the remote management PC by the following format: XXX.XXX.XXX.XXX

- **protocol**

  Specify the following protocol: HTTP, HTTPS, SSH

- **event**

  Specify the following event: normal, error
  “normal” means not error event. ”error” means error event.

You can change the displaying sequence of access log and display the specified number of access log by the specified from following options.

- **oemnec_headlog <number>**

  Display from <number> head of the access log.

- **oemnec_taillog <number>**

  Display from <number> back of the access log.

Enter the following command when you would like to use the above condition.

e.g.1) Display the access log whose username is Administrator.

```
show user==Administrator
```

e.g.2) Display the access log whose IP address is 192.168.1.100 and protocol is HTTP and event is error.

```
show ipaddress==192.168.1.100,protocol==HTTP,event==error
```

e.g.3) Display from 100 back of the access log whose timestamp is 10/10/2010 and protocol is HTTPS.

```
show –oemnec_taillog 100 timestamp==01/01/2010,protocol==HTTPS
```

Access log might not be correctly displayed with timestamp condition about the log of recorded from AC ON to DC ON on host system.

Clearing access log

To move the current default target to /admin1/sp1/log1/record1, enter the following command at the command prompt.

```
cd /admin1/sp1/log1/record1
```

Enter the following command, if you would like to clear the access log.

```
delete
```

Setting access log

To move the current default target to /admin1/sp1/log1, enter the following command at the command prompt.

```
cd /admin1/sp1/log1
```

Enter the following command, if you would like to confirm the access log as properties of the access log target which is /admin1/sp1/log1.

```
show
```

Enter the following command if you would like to modify a property of the setting access log.

```
set <Property>=<New value>
```

The properties which the access log target contains are as follows:

- **oemnec_operationlog_enable**

  This specifies whether access log for the system control and the BMC setting modification via Web browser is enabled. The valid values for this property are "2" and "3". "2" means that the access log is enabled. "3" means that the access log is disabled. This is the dynamic setting.

- **oemnec_sshlog_enable**

  This specifies whether access log for login/logout of SSH is enabled. The valid values for this property are "2" and "3". "2" means that the access log is enabled. "3" means that the access log is disabled. This is the dynamic setting.

- **oemnec_httpslog_enable**

  This specifies whether access log for login/logout of HTTPS is enabled. The valid values for this property are "2" and "3". "2" means that the access log is enabled. "3"

means that the access log is disabled. This is the dynamic setting.

- **oemnec_httplog_enable**

  This specifies whether access log for login/logout of HTTP is enabled. The valid values for this property are "2" and "3". "2" means that the access log is enabled. "3" means that the access log is disabled. This is the dynamic setting.

For example, enter the following command when you would like to use the access log for login/logout of HTTPS.

```
set oemnec_httpslog_enable=2
```

USER SETTINGS

This section describes how to confirm and modify the user account through the command line interface. To move the current default target to an user account target which you would like to confirm or (and) modify, enter the following command at the command prompt. <N> means any value between 1 and 12: Therefore you can select a user account between account1 and account12. The <N> corresponds to an order from the list of user accounts top on the user account configuration page through a Web browser.

```
cd /admin1/sp1/account<N>
```

Enter the following command, if you would like to confirm the information which the selected user account has as its properties.

```
show
```

Enter the following command if you would like to modify a property of the selected user account.

```
set <Property>=<New value>
```

The properties which the selected user account target contains are as follows:

- **UserID**

  This corresponds to a user name (login name). It becomes effective at next login if you change it.

- **UserPassword**

  This is the user password (only can be changed). "UserPassword=" is displayed but the password setting, value of this property, is not displayed when this property is displayed. It becomes effective at next login if you change it.

- **oemnec_Group**

  This specifies the user level. The valid values for this property are "User", "Operator" and "Administrator". It becomes effective at next login if you change it.

A user name can contain up to 15 alphanumeric characters, including “- (minus)” and “_ (underscore)”. “- (minus)” can not be used for the top of a user name. The password accepts up to 19 ASCII characters, except for “ (space)”, ““(quotation marks)”, “&”, “?”, “=”.

NETWORK SETTINGS

This section describes how to confirm and modify the network setting for management LAN through the command line interface. To move the current default target to /admin1/sp1/enetport1, enter the following command at the command prompt:

```
cd /admin1/sp1/enetport1
```

Enter the following command, if you would like to confirm properties of the Ethernet port target which is /admin1/sp1/enetport1.

```
show
```

The properties which the Ethernet port target contains are as follows:

- **PermanentAddress**

  This specifies the MAC address for the management LAN. This property is read-only.

- **AutoSense**

  This indicates whether Auto Negotiation is enabled for the LAN Connection Type setting of the management LAN. Note that, the valid values for this property are "TRUE" and "FALSE". "TRUE" means that the Auto Negotiation is enabled. "FALSE" means that the Auto Negotiation is disabled. This property is read-only.

- **FullDuplex**

  This indicates whether Full Duplex Mode is enabled for the LAN Connection Type setting of the management LAN when the Auto Negotiation (AutoSense) is disabled (FALSE). The value of this property is not displayed when the Auto Negotiation (AutoSense) is enabled (TRUE). This property is read-only.

- **PortType**

  This indicates Link Speed ("10Base-T" or "100Base-TX") for the LAN Connection Type setting of the management LAN when the Auto Negotiation (AutoSense) is disabled (FALSE). The value of this property is not displayed when the Auto Negotiation (AutoSense) is enabled (TRUE). This property is read-only.

Followings describe how to confirm and modify the access limitation setting for management LAN through the command line interface. To move the current default target to /admin1/sp1/enetport1/lanendpt1, enter the following command at the command prompt:

```
cd /admin1/sp1/enetport1/lanendpt1
```

Enter the following command, if you would like to confirm properties of the access limitation target which is /admin1/sp1/enetport1/lanendpt1.

```
show
```

Enter the following command if you would like to modify a property of the access limitation target.

```
set <Property>=<New value>
```

The properties which the access limitation target contains are as follows:

- **oemnec_allowedaccessips**

  This specifies the IP addresses that permit access to the management LAN. Divide IP address by "," (ex. 192.168.1.2, 192.168.1.2, …) or use asterisk (ex. 192.168.1.*), if you would like to set multiple permit IP address. Set "0.0.0.0" or no <value> (*) to this property, if you would like to clear the value of this property, It becomes effective at next login if you change it. The value of this property is cleared if oemnec_deniedaccessips is set.

  * "Set no <value>" means to input [Enter] key next to "=" key like following example.
    set oemnec_allowedaccessips=[Enter]

- **oemnec_deniedaccessips**

  This specifies the IP addresses that reject access to the management LAN. Divide IP address by "," (ex. 192.168.1.2, 192.168.1.2, …) or use asterisk (ex. 192.168.1.*), if you would like to set multiple reject IP address. Set "0.0.0.0" or no <value> (*) to this property, if you would like to clear the value of this property, It becomes effective at next login if you change it. The value of this property is cleared if oemnec_allowedaccessips is set.

  * "Set no <value>" means to input [Enter] key next to "=" key like following example.
    set oemnec_deniedaccessips=[Enter]

For example, enter the following command when you would like to permit access from 192.168.1.* and 192.168.3.4.

```
set oemnec_allowedaccessips=192.168.1.*,192.168.3.4
```

Clear all oemnec_allowedaccessips/oemnec_deniedaccessips values, if you would like NOT to restrict access by IP address for the management LAN.

The communication with ESMPRO/ServerManager is also restricted by this configuration. Permit the IP address used by the communication with ESMPRO/ServerManager if you would like to use ESMPRO/ ServerManager.

To restrict access by IP address used by logging in to the BMC's SSH server is impossible. So, if you would like to restrict the IP address, the following procedures are necessary.

At first, log out of current BMC's SSH session using the IP address and log in to the BMC's SSH server once again by using other IP address permitted by oemnec_allowedaccessips / oemnec_deniedaccessips (Access Permission Address) Configuration. Then change the configuration for NOT permitting the IP address which is previously used by the BMC's SSH server.

You can set the access restriction settings to 222 characters. The indication by the show command is displayed to 255 characters. The access restriction settings from Web browser are possible to 255 characters.

Followings describe how to confirm and modify the DHCP setting for management LAN through the command line interface. To move the current default target to /admin1/sp1/enetport1/lanendpt1/ipendpt1, enter the following command at the command prompt:

```
cd /admin1/sp1/enetport1/lanendpt1/ipendpt1
```

Enter the following command, if you would like to confirm properties of the DHCP target which is /admin1/sp1/enetport1/lanendpt1/ipendpt1.

```
show
```

Enter the following command if you would like to modify a property of the DHCP target.

```
set <Property>=<New value>
```

The properties which the DHCP target contains are as follows:

- **AddressOrigin**

  This specifies whether DHCP is enabled for the management LAN. Note that, the valid values for this property are "3" and "4". "3" means that the DHCP is disabled. "4" means that the DHCP is enabled. This is the dynamic setting.

- **IPv4Address**

  This specifies the IP address for the management LAN. This property is read-only.

- **SubnetMask**

  This specifies the subnet mask for the management LAN. This property is read-only.

For example, enter the following command when you would like to enable DHCP.

set AddressOrigin=4

Followings describe how to confirm the gateway setting for management LAN through the command line interface. To move the current default target to /admin1/sp1/enetport1/lanendpt1/ipendpt1/gateway1, enter the following command at the command prompt:

```
cd /admin1/sp1/enetport1/lanendpt1/ipendpt1/gateway1
```

Enter the following command, if you would like to confirm properties of the gateway target which is /admin1/sp1/enetport1/lanendpt1/ipendpt1/gateway1.

```
show
```

The properties which the gateway target contains are as follows:

- **InfoFormat**

  The value is "3". This specifies the AccessInfo is IPv4 address. This property is read-only.

- **AccessInfo**

  This specifies the IP address of the default gateway for the management LAN. This property is read-only.

Followings describe how to confirm and modify the network setting with disabling DHCP for management LAN through the command line interface. To move the current default target to /admin1/sp1/enetport1/lanendpt1/ipendpt1/staticipsettings1, enter the following command at the command prompt:

```
cd /admin1/sp1/enetport1/lanendpt1/ipendpt1/staticipsettings1
```

Enter the following command, if you would like to confirm properties of the static network setting target which is /admin1/sp1/enetport1/lanendpt1/ipendpt1/staticipsettings1.

```
show
```

Enter the following command if you would like to modify a property of the static network setting target.

```
set <Property>=<New value>
```

The properties which the static network setting target contains are as follows:

- **IPv4Address**

  This specifies the IP address for the management LAN when DHCP is disabled. This is the dynamic setting.

- **SubnetMask**

  This specifies the subnet mask for the management LAN when DHCP is disabled. This is the dynamic setting.

- **GatewayIPv4Address**

  This specifies the IP address of the default gateway for the management LAN when DHCP is disabled. This is the dynamic setting

Followings describe how to confirm and modify the HTTP service for management LAN through the command line interface. To move the current default target to /admin1/sp1/httpsvc1, enter the following command at the command prompt:

```
cd /admin1/sp1/httpsvc1
```

Enter the following command, if you would like to confirm properties of the HTTP service target which is /admin1/sp1/httpsvc1.

```
show
```

Enter the following command if you would like to modify a property of the HTTP service target.

```
set <Property>=<New value>
```

The properties which the HTTP service target contains are as follows:

- **EnabledState**

  This specifies whether HTTP port is enabled for the management LAN. The valid values for this property are "2" and "3". "2" means that the HTTP port is enabled. "3" means that the HTTP port is disabled. This is the dynamic setting.

- **oemnec_httpport**

  This specifies the HTTP port for the management LAN. This is the dynamic setting.

Followings describe how to confirm and modify the HTTPS service for management LAN through the command line interface. To move the current default target to /admin1/sp1/httpssvc1, enter the following command at the command prompt:

```
cd /admin1/sp1/httpssvc1
```

Enter the following command, if you would like to confirm properties of the HTTPS service target which is /admin1/sp1/httpssvc1.

```
show
```

Enter the following command if you would like to modify a property of the HTTPS service target.

```
set <Property>=<New value>
```

The properties which the HTTPS service target contains are as follows:

- **EnabledState**

  This specifies whether HTTPS port is enabled for the management LAN. The valid values for this property are "2" and "3". "2" means that the HTTPS port is enabled. "3" means that the HTTPS port is disabled. This is the dynamic setting.

- **oemnec_httpsport**

  This specifies the HTTPS port for the management LAN. This is the dynamic setting.

Followings describe how to confirm and modify the SSH service for management LAN through the command line interface. To move the current default target to /admin1/sp1/sshsvc1, enter the following command at the command prompt:

```
cd /admin1/sp1/sshsvc1
```

Enter the following command, if you would like to confirm properties of the SSH service target which is /admin1/sp1/sshsvc1.

```
show
```

Enter the following command if you would like to modify a property of the SSH service target.

```
set <Property>=<New value>
```

The properties which the SSH service target contains are as follows:

- **EnabledState**

  This specifies whether SSH port is enabled for the management LAN. The valid values for this property are "2" and "3". "2" means that the SSH port is enabled. "3" means that the SSH port is disabled. This is the dynamic setting.

- **oemnec_sshport**

  This specifies the SSH port for the management LAN. This is the dynamic setting.

POWER CONSUMPTION CONTROL

You can control the power consumption of the host system through the command line interface.

The user must have an account as administrator for controlling the power consumption.

To move the current default target to /admin1/system1, enter the following command at the command prompt:

```
cd /admin1/system1
```

State confirmation and modification of Power Consumption Control

Enter the following command, if you would like to confirm properties related to the power consumption.

```
show
```

Enter the following command if you would like to modify a property related to the power consumption.

```
set <Property>=<New value>
```

The properties related to power consumption on /admin1/system1 are as follows. The “()” of the property name is a property name in the specific product.
“oemnec_ProcessorCoreDisableMax”, “oemnec_ProcessorCoreDisable”, “oemnec_BootPerfomanceOptimized”, “oemnec_BootTimeConfig”, “oemnec_NonAggressiveModeCorrectionTimeLimit”, “oemnec_NonAggressiveModeCapvalue”, “oemnec_NonAggressiveModeSetableCapvalue”, “oemnec_NonAggressiveMode” don’t display at specific product:

- **EnabledState**

  The value is always "2".This specifies whether SSH port is enabled for the management LAN. This property is read-only.

- **oemnec_SafePowerCapping**

  This specifies whether fault check of the power consumption sensor is enabled. The valid values for this property are "enabled" and "disabled". "enabled" means that the fault check is enabled. "disable" means that the fault check is disabled. Default setting is "disabled".

- **oemnec_ProcessorCoreDisableMax**

  This specifies Max Core number which can be set from oemnec_ProcessorCoreDisable property. This property is not displayed if oemnec_BootTimeConfig is disabled.

- **oemnec_ProcessorCoreDisable**

  This specifies the number of CPU core to disable. This is the dynamic setting. This property is not displayed if oemnec_BootTimeConfig is disabled.

- **oemnec_BootPerformanceOptimized**

  This specifies whether Performance Optimized mode is enabled. This is the dynamic setting. This property is not displayed if oemnec_BootTimeConfig is disabled.

- **oemnec_BootTimeConfig**

  This specifies whether BootingMode is enabled. This is the dynamic setting. Default value is “disabled”. This property supported by specific product.

- **oemnec_NonAggressiveModeCorrectionTimeLimit**

  Specify the maximum time to take corrective actions in order to bring the system power consumption back to the specified ‘Power Threshold (Pn)’ before generating System Event Log and sending alert. This is the dynamic setting. This property is not displayed if oemnec_NonAggressiveMode is disabled.

- **oemnec_NonAggresiveModeCapvalue**

  This specifies the value of the power consumption starting he power consumption control. This is the dynamic setting. This property is not displayed if oemnec_NonAggressiveMode is disabled.

- **oemnec_NonAggressiveModeSetableCapvalue**

  This specifies the value range of the settable oemnec_NonAggressiveModeCapvalue. This property is read-only. This property is not displayed if oemnec_NonAggressiveMode is disabled.

- **oemnec_NonAggressiveMode**

  Non-Aggressive Mode brings the system power consumption under the specified upper limit threshold without extremely decreasing system performance. The valid values for this property are "enabled" and "disabled". "enabled" means that the power control is enabled. "disable" means that the power control is disabled. Default setting is "disabled".

- **oemnec_ExceptionAction_Shutdown_Enable**

  This specifies whether the shutdown function of the system is enabled when power consumption control is of no effect within a given oemnec_AggressiveModeCorrectionTimeLimit after the power consumption pass oemnec_AggressiveModeCapvalue. The valid values for this property are "enabled" and "disabled". "enabled" means that the shutdown function is enabled. "disable" means that the shutdown function is disabled. This is the dynamic setting. This property is not displayed if oemnec_AggressiveMode is disabled.

- **oemnec_AggressiveModeCorrectionTimeLimit (oemnec_CorrectionTimeLimit)**

  The shutdown of the system will be done according to setting of oemnec_ExceptionAction_Shutdown_Enable when power consumption control is of no effect within a given oemnec_AggressiveModeCorrectionTimeLimit (seconds) after the power consumption pass oemnec_AggresiveModeCapvalue. This is the dynamic setting. This property is not displayed if oemnec_AggressiveMode is disabled.

- **oemnec_AggresiveModeCapvalue (oemnec_PowerCapvalue)**

This specifies the value of the power consumption starting he power consumption control. This is the dynamic setting. This property is not displayed if oemnec_AggressiveMode is disabled.

- **oemnec_AggressiveModeSetablePowerCapvalue (oemnec_setablePowerCapvalue)**

  This specifies the value range of the settable oemnec_AggressiveModeCapvalue. This property is read-only. This property is not displayed if oemnec_AggressiveMode is disabled.

- **oemnec_AggressiveMode (oemnec_CriticalPowerCapSensor)**

  This specifies whether the power consumption control under the specified upper limit threshold is enabled. The valid values for this property are "enabled" and "disabled". "enabled" means that the power control is enabled. "disable" means that the power control is disabled. Default setting is "disabled".

The system performance, such as frequency of CPU, decreases for reducing power consumption when the power control is enabled.

CONFIRMING SYSTEM INFORMATION

This section describes how to confirm the system information (product, BIOS/BMC firmware revision, MAC address of System LAN, CPU, Memory) through the command line interface.

The values of the properties for items not supported by the host system is not displayed for the system information. Moreover, the values of the properties for items supported with the host system might not be displayed the system information according to a state of a power supply and mounting such as a device of the system either.

Confirming Product Information

You can confirm the product information through the command line interface by entering following the basic command at the command prompt.

```
show /admin1/system1
```

In this case, value of oemnec_productname property indicates "Product Name" information at the "Properties" section. Also value of oemnec_modelnumber property indicates "Part / Model Number" information and value of oemnec_serialnumber property indicates "Product Serial Number" information. These properties for the product information are read-only.

Confirming MAC address of System LAN

To move the current default target to /admin1/system1, enter the following command at the command prompt.

```
cd /admin1/system1
```

Here, to confirm all the targets for System LAN (onboard LAN), enter the following command at the command prompt. All the System LAN targets are represented as enetport<N> strings at "Targets" section. <N> means value of one-origin integer.

```
show
```

Next, when the following command is input, the MAC address of the System LAN target is appeared at the right side of "PermanentAddress=" string. <N> means the number of the System LAN target which you would like to confirm.

```
show enetport<N>
```

For example, enter the following command when you would like to confirm the MAC address of LAN Port1.

```
show enetport1
```

Confirming System BIOS revision

You can confirm the System BIOS revision through the command line interface by entering following the basic command at the command prompt.

```
show /admin1/system1/swid1
```

In this case, the System BIOS revision is appeared at the right side of "VersionString=" string in the "Properties" section.

Confirming BMC firmware revision

You can confirm the BMC firmware revision through the command line interface by entering following the basic command at the command prompt.

```
show /admin1/sp1/swid1
```

In this case, the BMC firmware revision is appeared at the right side of "VersionString=" string in the "Properties" section. Also the SDR revision is appeared at the right side of " oemnec_sdrversion =" string.

Confirming CPU Information

To move the current default target to /admin1/system1, enter the following command at the command prompt.

```
cd /admin1/system1
```

Here, to confirm all the targets for CPU, enter the following command at the command prompt. All the CPU targets are represented as cpu<N> strings at "Targets" section. <N> means value of one-origin integer.

```
show
```

Next, when the following command is input, information of a specific CPU target is displayed at "Properties" section. Here, <N> means CPU target number which you would like to confirm.

```
show cpu<N>
```

The EnabledState property of the CPU target indicates the CPU status. "2" indicates CPU installed. No value (Only "EnabledState=" string is displayed.) indicates CPU not installed. "3" indicates that the CPU is defected. The values of the other properties (such as oemnec_clock) are not displayed (Only property name with "=" string is displayed.). if the CPU is not installed (Only "EnabledState=" string is displayed.). Also, the values of the properties not supported by the host system are not displayed.

For example, enter the following command when you would like to confirm the information of CPU1.

`show cpu1`

The example of displaying information in this case is shown below.

```
ufip=/admin1/system1/cpu1
        Properties:
            EnabledState=enabled
            oemnec_clock=2660MHz
            oemnec_validcore=4
            oemnec_maxcore=4
            oemnec_validthread=8
            oemnec_maxthread=8
            oemnec_l1cache=256KB
            oemnec_l2cache=1024KB
            oemnec_l3cache=8192KB

        Verbs:
            cd
            exit
            help
            show
            version
```

Confirming Memory Information

To move the current default target to /admin1/system1, enter the following command at the command prompt.

```
cd /admin1/system1
```

Here, to confirm all the targets for memory (DIMM), enter the following command at the command prompt. All the memory (DIMM) targets are represented as memory<N> strings at "Targets" section. <N> means value of one-origin integer.

```
show
```

Next, when the following command is input, information of a specific memory (DIMM) target is displayed at "Properties" section. Here, <N> means memory (DIMM) target number which you would like to confirm.

```
show memory<N>
```

The EnabledState property of the memory target indicates the memory (DIMM) status. "2" indicates memory (DIMM) installed. "3" indicates memory (DIMM) error. If the memory (DIMM) is not installed the target will not be displayed. Also, the values of the properties not supported by the host system are not displayed.

For example, enter the following command when you would like to confirm the information of memory1 (CPU1_DIMM1).

```
show memory1
```

The example of displaying information in this case is shown below.

```
ufip=/admin1/system1/memory1
    Properties:
        enabledstate=2
        oemnec_slotname=CPU1_DIMM1
        oemnec_clocksize=1024MB 1066MHz

    Verbs:
        cd
        exit
        help
        show
        version
```

SPECIAL EXTENDED COMMANDS

This section describes the special extended command which can do state acquisition (powerstate, lampstate) and interrupt generation for OS dump (nmidump). The special extended commands use the syntaxes different from the basic command's ones.

State Acquisition

You can acquire the state of the system at the command prompt:

Commands to acquire the state are executable in all user levels.

Power State acquisition

Power state acquisition command (powerstate) is executable only when current default target is "/admin1" or "/admin1/system1".

Enter the following command, if the current default target is not "/admin1" and "/admin1/system1".

```
cd /admin1
  or
cd /admin1/system1
```

Enter the following command at the command prompt:

```
powerstate
```

One of the following responses is returned according to the power state.

power on
System power is on.

power off
System power is off.

Lamp State acquisition

Lamp state acquisition command (lampstate) is executable only when current default target is "/admin1", "/admin1/system1" or “/admin1/system1/led1”.

Enter the following command, if the current default target is not "/admin1", "/admin1/system1" or “/admin1/system1/led1”.

```
cd /admin1
  or
cd /admin1/system1
  or
cd /admin1/system1/led1
```

Status LED state acquisition

Enter the following command at the command prompt:

```
lampstate -statuslamp
```

One of the following responses is returned according to the STATUS LED state.

off
STATUS LED is turned off.

green on
STATUS LED lights in green.

green blink
STATUS LED is blinking in green.

amber on
STATUS LED lights in amber.

amber blink
STATUS LED is blinking in amber.

red on
STATUS LED lights in red.

red blink
STATUS LED is blinking in red.

The state of the STATUS LED and the meaning are different according to the system. Refer to the User's Guide of the system for details.

UID LED State acquisition

Enter the following command at the command prompt:

```
lampstate -uidlamp
```

One of the following responses is returned according to actual display state of the UID LED.

off
UID LED is turned off.

on
UID LED is turned on (lights).

blink
UID LED is blinking (flashing).

If the UID LED is not mounted into the host system, the "UID LED State acquisition" function works only to the virtual UID LED of the Server Panel. Please refer to the User's Guide of your host system for the description of the UID LED.

Interrupt Generation for OS Dump

You can execute OS dump by entering following command at the command prompt.

```
nmidump /admin1/system1
```

The user must have an account as administrator for executing the nmidump command.

The above command behavior is equivalent to pressing the DUMP switch on the host system.

7. WS-Management (Web Service for Management)

OVERVIEW

With the WS-Management Protocol, you can control the host system and check the sensor of host system.

EXPRESSSCOPE Engine 3 implementation of WS-Management complies with the specification, DTMF Web Services for Management 1.0.0.

EXPRESSSCOPE Engine 3 is confirmed the WS-Management operation with the following tools that support the WS-Management protocol.

- **Windows Remote Management (WinRM) 2.0**

To use WS-Management, you need to configure HTTPS connection to be enabled. Refer to the “Management LAN Settings” in the “Chapter 2: Configuring the Host System”.

POWER CONTROL

You can perform power control of the host system.

The user must have an account as operator or administrator for power control.

Performing power control when the operating system is running may cause the loss of data in the host system.

Power ON

Create the file input-RequestPowerStateChange2.xml and enter the following command, if you use WinRM.

winrm invoke RequestPowerStateChange
http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_PowerManagementService?__cimnamespace=root/cimv2+Name=IPMI¥_Power¥_Service+CreationClassName=CIM_PowerManagementService+SystemName=Unknown.IPMI¥_BMC¥_DeviceID.32+SystemCreationClassName=Host_ComputerSystem
-r:https://IP_ADDRESS/wsman -username:USERNAME -password:PASSWORD
-auth:basic -encoding:utf-8 -format:xml -file:input-RequestPowerStateChange2.xml
-skipCAcheck -skipCNcheck -skipRevocationcheck

input-RequestPowerStateChange2.xml

```
<n1:RequestPowerStateChange_INPUT
xmlns:n1="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_Power
ManagementService"
xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
xmlns:wsman="http://schemas.dmtf.org/wbem/wsman/1/wsman.xsd">
<n1:PowerState>2</n1:PowerState>
<n1:ManagedElement>
<wsa:ReferenceParameters>
<wsman:ResourceURI>http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/
Host_ComputerSystem</wsman:ResourceURI>
<wsman:SelectorSet>
<wsman:Selector Name='__cimnamespace'>root/cimv2</wsman:Selector>
<wsman:Selector
Name='CreationClassName'>Host_ComputerSystem</wsman:Selector>
<wsman:Selector Name='Name'>Unknown.IPMI BMC
DeviceID.32</wsman:Selector>
</wsman:SelectorSet>
</wsa:ReferenceParameters>
</n1:ManagedElement>
</n1:RequestPowerStateChange_INPUT>
```

Please change according to your environment.
“IP_ADDRESS” : IP address of EXPRESSSCOPE Engine 3.
“USERNAME/PASSWORD”: username/password of EXPRESSSCOPE Engine 3.

Forced Power OFF

Create the file input-RequestPowerStateChange6.xml and enter the following command, if you use WinRM.

winrm invoke RequestPowerStateChange
http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_PowerManagementService?__cimnamespace=root/cimv2+Name=IPMI¥_Power¥_Service+CreationClassName=CIM_PowerManagementService+SystemName=Unknown.IPMI¥_BMC¥_DeviceI

D.32+SystemCreationClassName=Host_ComputerSystem
-r:https://IP_ADDRESS/wsman -username:USERNAME -password:PASSWORD
-auth:basic -encoding:utf-8 -format:xml -file:input-RequestPowerStateChange6.xml
-skipCNcheck -skipCAcheck -skipRevocationcheck

input-RequestPowerStateChange6.xml

```
<n1:RequestPowerStateChange_INPUT
xmlns:n1="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_Power
ManagementService"
xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
xmlns:wsman="http://schemas.dmtf.org/wbem/wsman/1/wsman.xsd">
<n1:PowerState>6</n1:PowerState>
<n1:ManagedElement>
<wsa:ReferenceParameters>
<wsman:ResourceURI>http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/
Host_ComputerSystem</wsman:ResourceURI>
<wsman:SelectorSet>
<wsman:Selector Name='__cimnamespace'>root/cimv2</wsman:Selector>
<wsman:Selector
Name='CreationClassName'>Host_ComputerSystem</wsman:Selector>
<wsman:Selector Name='Name'>Unknown.IPMI BMC
DeviceID.32</wsman:Selector>
</wsman:SelectorSet>
</wsa:ReferenceParameters>
</n1:ManagedElement>
</n1:RequestPowerStateChange_INPUT>
```

Please change according to your environment.
“IP_ADDRESS” : IP address of EXPRESSSCOPE Engine 3.
“USERNAME/PASSWORD”: username/password of EXPRESSSCOPE Engine 3.

OS Shutdown

Create the file input-RequestPowerStateChange8.xml and enter the following command, if you use WinRM.

winrm invoke RequestPowerStateChange
http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_PowerManagementService?__cimnamespace=root/cimv2+Name=IPMI¥_Power¥_Service+CreationClassName=CIM_PowerManagementService+SystemName=Unknown.IPMI¥_BMC¥_DeviceID.32+SystemCreationClassName=Host_ComputerSystem
-r:https://IP_ADDRESS/wsman -username:USERNAME -password:PASSWORD
-auth:basic -encoding:utf-8 -format:xml -file:input-RequestPowerStateChange8.xml
-skipCAcheck -skipCNcheck -skipRevocationcheck

input-RequestPowerStateChange8.xml

```
<n1:RequestPowerStateChange_INPUT
xmlns:n1="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_Power
ManagementService"
xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
xmlns:wsman="http://schemas.dmtf.org/wbem/wsman/1/wsman.xsd">
<n1:PowerState>8</n1:PowerState>
<n1:ManagedElement>
<wsa:ReferenceParameters>
<wsman:ResourceURI>http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/
Host_ComputerSystem</wsman:ResourceURI>
<wsman:SelectorSet>
<wsman:Selector Name='__cimnamespace'>root/cimv2</wsman:Selector>
<wsman:Selector
Name='CreationClassName'>Host_ComputerSystem</wsman:Selector>
<wsman:Selector Name='Name'>Unknown.IPMI BMC
DeviceID.32</wsman:Selector>
</wsman:SelectorSet>
</wsa:ReferenceParameters>
</n1:ManagedElement>
</n1:RequestPowerStateChange_INPUT>
```

The above OS shutdown is equivalent to pressing the POWER switch when the power of the host system is on. Your operating system must be set to shut down when you power off the system.

Please change according to your environment.
“IP_ADDRESS” : IP address of EXPRESSSCOPE Engine 3.
“USERNAME/PASSWORD”: username/password of EXPRESSSCOPE Engine 3.

System Reset

Create the file input-RequestPowerStateChange10.xml and enter the following command, if you use WinRM.

winrm invoke RequestPowerStateChange
http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_PowerManagementService?__cimnamespace=root/cimv2+Name=IPMI¥_Power¥_Service+CreationClassName=CIM_PowerManagementService+SystemName=Unknown.IPMI¥_BMC¥_DeviceID.32+SystemCreationClassName=Host_ComputerSystem
-r:https://IP_ADDRESS/wsman -username:USERNAME -password:PASSWORD
-auth:basic -encoding:utf-8 -format:xml
-file:input-RequestPowerStateChange10.xml -skipCAcheck -skipCNcheck
-skipRevocationcheck

input-RequestPowerStateChange10.xml

```
<n1:RequestPowerStateChange_INPUT
xmlns:n1="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_Power
ManagementService"
xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
xmlns:wsman="http://schemas.dmtf.org/wbem/wsman/1/wsman.xsd">
<n1:PowerState>10</n1:PowerState>
<n1:ManagedElement>
<wsa:ReferenceParameters>
<wsman:ResourceURI>http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/
Host_ComputerSystem</wsman:ResourceURI>
<wsman:SelectorSet>
<wsman:Selector Name='__cimnamespace'>root/cimv2</wsman:Selector>
<wsman:Selector
Name='CreationClassName'>Host_ComputerSystem</wsman:Selector>
<wsman:Selector Name='Name'>Unknown.IPMI BMC
DeviceID.32</wsman:Selector>
</wsman:SelectorSet>
</wsa:ReferenceParameters>
</n1:ManagedElement>
</n1:RequestPowerStateChange_INPUT>
```

Please change according to your environment.
“IP_ADDRESS” : IP address of EXPRESSSCOPE Engine 3.
“USERNAME/PASSWORD”: username/password of EXPRESSSCOPE Engine 3.

Interrupt Generation for OS Dump

Create the file input-RequestPowerStateChange11.xml and enter the following command, if you use WinRM.

winrm invoke RequestPowerStateChange
http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_PowerManagementService?__cimnamespace=root/cimv2+Name=IPMI¥_Power¥_Service+CreationClassName=CIM_PowerManagementService+SystemName=Unknown.IPMI¥_BMC¥_DeviceID.32+SystemCreationClassName=Host_ComputerSystem
-r:https://IP_ADDRESS/wsman -username:USERNAME -password:PASSWORD
-auth:basic -encoding:utf-8 -format:xml
-file:input-RequestPowerStateChange11.xml -skipCAcheck -skipCNcheck
-skipRevocationcheck

input-RequestPowerStateChange11.xml

```
<n1:RequestPowerStateChange_INPUT
xmlns:n1="http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_Power
ManagementService"
xmlns:wsa="http://schemas.xmlsoap.org/ws/2004/08/addressing"
xmlns:wsman="http://schemas.dmtf.org/wbem/wsman/1/wsman.xsd">
<n1:PowerState>11</n1:PowerState>
<n1:ManagedElement>
<wsa:ReferenceParameters>
<wsman:ResourceURI>http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/
Host_ComputerSystem</wsman:ResourceURI>
<wsman:SelectorSet>
<wsman:Selector Name='__cimnamespace'>root/cimv2</wsman:Selector>
<wsman:Selector
Name='CreationClassName'>Host_ComputerSystem</wsman:Selector>
<wsman:Selector Name='Name'>Unknown.IPMI BMC
DeviceID.32</wsman:Selector>
</wsman:SelectorSet>
</wsa:ReferenceParameters>
</n1:ManagedElement>
</n1:RequestPowerStateChange_INPUT>
```

The above command behavior is equivalent to pressing the DUMP switch on the host system.

Change according to your environment.
“IP_ADDRESS” : IP address of EXPRESSSCOPE Engine 3.
“USERNAME/PASSWORD”: username/password of EXPRESSSCOPE Engine 3.

Performing interrupt generation for OS dump when the operating system is running may cause the loss of data in the host system.

SENSOR INFORMATION

You can get sensor information either by enumeration of all sensors or by retrieving specified sensor.

Enumeration of All Sensors

Enter the following command, if you enumerate numeric sensors (e.g.: temperature, voltage) with WinRM.

winrm enumerate
http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_NumericSensor
-username:USERNAME -password:PASSWORD -r:https://IP_ADDRESS/wsman
-auth:basic -encoding:utf-8 -skipCAcheck -skipCNcheck -skipRevocationcheck

Enter the following command, if you enumerate non-numeric sensors (e.g.: PSU, HDD) with WinRM.

winrm enumerate
http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_Sensor
-username:USERNAME -password:PASSWORD -r:https://IP_ADDRESS/wsman
-auth:basic -encoding:utf-8 -skipCAcheck -skipCNcheck -skipRevocationcheck

Change according to your environment.
“IP_ADDRESS” : IP address of EXPRESSSCOPE Engine 3.
“USERNAME/PASSWORD”: username/password of EXPRESSSCOPE Engine 3.

Retrieving Specified Sensor

You can retrieve the sensor by specifying sensor number.

Enter the following command, if you retrieve the sensor of sensor number 48 with the WinRM.

winrm get
"http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/CIM_NumericSensor?SystemCreationClassName=CIM_ComputerSystem+CreationClassName=CIM_NumericSensor+SystemName=Unknown.IPMI BMC DeviceID.32+DeviceID=1.48.0.32.1.99"
-r:https://IP_ADDRESS/wsman -username:USERNAME -password:PASSWORD
-auth:basic -encoding:utf-8 -skipCAcheck -skipCNcheck -skipRevocationcheck

Change according to your environment.
“IP_ADDRESS” : IP address of EXPRESSSCOPE Engine 3.
“USERNAME/PASSWORD”: username/password of EXPRESSSCOPE Engine 3.

Specify the “Device ID” returned in the response of enumerating all sensors.

8. Troubleshooting

ERROR MESSAGES

Abnormality occurs while using remote management, and the error dialog might be displayed in management PC. Please refer to the list of the message of the online help for the main message and the coping process.

ABOUT ECO SETTING

The electric power value may not be reached to Power Cap Value.
☑ The electric power value might not necessarily reach even the value of Power Cap value.
The electric power control lowers the power consumption of the system by lowering the frequency of CPU/Memory.
When CPU/Memory Throttling value reaches 100%, the electric power value doesn't fall any more.

“Failed to access BMC.” error has occurred while executing ECO setting.
☑ If you execute ECO setting during shutdown the OS of the host system, ECO setting may not be set correctly. In this case, please execute again after shutdown process is finished.

For more detail about the Power Monitoring and Power Control Function, please reference the following site.

http://www.58support.nec.co.jp/global/download/index.html
[Others] - [Technology papers]

OTHERS TIPS

Should you have troubles while using the BMC for remote control, monitoring, and management of the host system, please first check the system according to the online help to troubleshoot your issue prior to sending it for repair.

For the issues regarding your system operation, please refer to the User’s Guide attached to your system.

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- Busybox
- Linux Kernel
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 *
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```
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*
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*
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```

MD5

```
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 */

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 */
```

SHA1

```
/*
 * FIPS 180-2 SHA-224/256/384/512 implementation
 * Last update: 02/02/2007
 * Issue date:  04/30/2005
 *
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 */
```

HMAC-SHA1

```
/*-
 * HMAC-SHA-224/256/384/512 implementation
 * Last update: 06/15/2005
 * Issue date:  06/15/2005
 *
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